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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/607,922	06/30/2000	William Frederick Bosch	015290-426	9687

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EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 01/06/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/607,922

Applicant(s)

BOSCH, WILLIAM FREDERICK

Examiner

Lynette T. Umez-Eronini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 5 recites the limitation "the particle counter" in line 6 lacks antecedent basis.

Claim Rejections - 35 USC § 102

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 15-28, 30, 33, and 34 rejected under 35 U.S.C. 102(a) as being anticipated by Schoepp (99/50886).

As pertaining to claims 15-28 and 30, Schoepp teaches a method of plasma conditioning a sintered surface of a ceramic part of a semiconductor processing chamber, the part being made of a ceramic material, the method comprising treating a sintered SiC surface and reducing particle contamination by supplying process gas to the processing chamber (page 2, lines 13-15 and page 3, line 8-9) and energizing the process gas into a plasma that comprises high density plasma (page 2, line 28 - page 3, line 8) with a chamber pressure below 300mTorr, antenna power at 200-5000 watts, and process gas that includes CHF₃, C₂HF₅ and or C₂F₆ (page 10, lines 11-15). The

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aforementioned further reads on, the surface of the ceramic part has been machined and sintered prior to treating the surface with a high intensity plasma as in claims 33 and 34.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schoepp (WO '886) as applied to claim 15 above.

Schoepp differs in failing to teach c). after b) processing production wafers in the plasma reactor.

It is the examiner's position that since Schoepp teaches treating the surface of the ceramic part with high intensity plasma in the chamber while processing a substrate in the reactor, then it would be obvious to one having ordinary skill in the art at the time of the claimed invention to practice these steps separately for the purpose of obtaining the claimed invention.

7. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schoepp (WO '886) as applied to claim 15 above, and further in view of Huang et al. (US 6,267,172 B1).

Schoepp differs in failing to teach plasma conditioning comprising treating the machined and/or sintered surface with a high density plasma generated while seasoning the reactor.

Huang teaches seasoning a high density plasma etching chamber by supplying a mixture of chlorine, oxygen, helium and radio frequency power to wafer and radio frequency bias power to chamber walls to excite the gas mixture (Table 1 and claim 10).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Lu in view of Schoepp by plasma treating a high density chamber as taught by Huang regardless of whether the chamber comprises a non-oxide, sintered and/or machined ceramic part for the purpose of cutting down the number of processing steps involved in restoring the electrical characteristics of processing chamber after it has undergone cleaning process (column 1, lines 24-33).

Claim Rejections - 35 USC § 103

8. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al. (US 5,904,778) as applied in view of Wicker (US 5,863,376).

Lu teaches a method of processing semiconductor substrates and reducing particle contamination during processing of the substrate. The method comprises the steps of:

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loading a wafer that is supported on a pedestal in a vacuum (high density plasma oxide etcher) chamber that is made of silicon carbide (Figure 1; column 1, lines 20, 21, 24-27, and 36-40; Table 4; column 9, line 61 – column 10, line 24; and column 11, line 59 - column 12, line 5);

etching the wafer (silicon oxide overlying silicon or polysilicon and CVD SiC materials which can be applied to complex shapes) samples with a fluorocarbon plasma (column 1, lines 53-58 and column 7, lines 4-6, 53 and 54), reads on,

(a) placing at least one substrate on a substrate holder in an interior space of a vacuum processing chamber, the processing chamber including at least one non-oxide ceramic part having a machined and /or sintered surface exposed to the interior space;

(b) processing the at least one substrate by supplying process gas to the processing chamber; and inspecting these samples by a microscope after etching (Abstract; column 7, lines 22-24 and 40-45), which suggests

(c) removing the at least one substrate from the processing chamber.

Lu differs in failing to teach the exposed surface having been treated to reduce particles of the non-oxide ceramic material attached to the exposed surface by a high intensity plasma condition treatment, in claim 1.

Wicker teaches a method processing a substrate in a vacuum processing chamber (column 5, lines 39-43 and 52-54), which contains a aluminum nitride (same as applicant's non-oxide ceramic material) distribution plate (column 6, lines 21-26) and which is operated below 300 mTorr, 200-2000 watts, and with He and process gas such as CHF₃ (column 5, lines 59-65), which reads on exposing the surface of the non-oxide

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ceramic material attached to the exposed surface by a high intensity plasma treatment. Since Wicker uses the same method and operating conditions in applying a plasma to a non-oxide ceramic material, then using Wicker's processing method would inherently result in the exposed surface having been treated to reduce particles of the non-oxide ceramic material attached to the exposed surface by a high intensity plasma condition treatment.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Lu by using Wicker's method of applying a high density plasma to a surface of a non-oxide ceramic material for the purpose of minimizing process drift (changes in process results i.e. etch rate and etch profile, wherein the substrates are not within specifications and cannot be used), (column 2, lines 47-57).

Lu differs in failing to teach the ceramic part comprises a gas distribution plate, and a planar coil, and to specify process parameters as recited in **claim 4**; treatment of the exposed surface with an oxygen gas into a plasma state, in **claim 12**; and sequential treatment of no more than 50 wafers in the processing chamber, in **claim 5**.

Wicker teaches vacuum plasma processing chamber comprising:

a process of etching the wafers followed by ashing with O₂ (column 5, lines 13-18), which reads on treating the exposed surface with an oxygen gas is a plasma state;

a vacuum pressure at below 300 mTorr and radio frequency bias at less than 2200 watts (column 5, lines 59-61); and

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a sequential method of processing of 25 wafers in the chamber (column 5, lines 5 and 6).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Lu using oxygen gas in the processing chamber, the process parameters, and sequential treatment of no more than 50 wafers in the processing chamber as taught by Wicker for the purpose of minimizing the degradation of the quality of the processed substrate during sequential batch processing of substrates (Abstract).

9. Claims 31, 32 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu ('778) in view of Wicker ('376) as applied to claim 1, and further in view of Schoepp (WO '886).

Lu differs in failing to teach the surface of the part has been machined prior to being treated by the high intensity plasma conditioning treatment, in claim 31 and the surface of the part has been sintered prior to treating the surface with a high intensity conditioning treatment, in claim 33.

Schoepp teaches sintering and machining silicon carbide (same as applicant's ceramic part) material (page 11, lines 10-12 and 21-23), which is formed as a separate piece attachable to the reaction chamber (page 10, lines 16-17); supplying process gas to the processing chamber (page 2, lines 13-15 and page 3, line 8-9); and energizing the process gas into a plasma that comprises high density plasma (page 2, line 28 - page 3, line 8), which reads on, the surface of the part has been machined prior to

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being treated by the high intensity plasma conditioning treatment and the surface of the part has been sintered prior to being treated by the high intensity plasma conditioning.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Lu by using Schoepp's method of treating surface of the ceramic material that has been sintered and machined prior to being treated by the high density plasma for the purpose of providing improvements in reducing contamination of substrates (Schoepp, page 5, lines 21-23).

Schoepp differs in failing to teach c), after b), processing production wafers in the plasma reactor, in claim 35.

It is the examiner's position that since Schoepp teaches treating the surface of the ceramic part with high intensity plasma in the chamber while processing a substrate in the reactor, then it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to practice these steps separately for the purpose of obtaining the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers

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for the organization where this application or proceeding is assigned are 703-972-9310

for regular communications and 703-972-9311 for After Final communications.

Lynette T. Ulm-Eurini

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January 2, 2003